

REMARKS/ARGUMENTS

The amendment is in response to the Office Action dated May 6, 2004. Claims 1-24 are pending in the present application. Applicant has amended claims 1, 4, 5, 9, 12, 17 and 20, and canceled claims 2-3, 10-11 and 18-19. Accordingly, claims 1, 4-9, 13-17, and 20-24 remain pending in the present application.

Objection to the Specification

The Examiner objected to the Abstract and to the arrangement of the Specification. In particular, the Examiner noted that the Abstract failed to comply with MPEP §608.01(b) and that the Specification failed to conform with 37 CFR 1.77(b). Applicant has amended the Specification and the Abstract to comply with the rules. No new matter has been presented.

Objections to the Claims

The Examiner objected to claim 5 because it depends from itself. Applicants have amended claim 5 to provide proper claim dependency.

Amended Claims

Independent claims 1, 9, and 17 were amended to incorporate the limitations of claims 2-3, 10-11 and 18-19, respectively. In addition, the independent claims recite continuing the scan if the row does not satisfy the set of predicates of the query “irrespective of a current lock on the row.” Support for this amendment is found in the Specification at page 4, line 18 to page 5, line 19. No new matter has been presented.

Claims 4, 5, 12 and 20 were amended to provide proper claim dependencies in light of the canceled claims. No new matter has been presented and the amendments have no effect on the scopes of the claims.

Claim Rejections

The Examiner rejected claims 1-24 under 35 U.S.C. §102(e) as being anticipated by Ponnekanti (U.S. Patent No. 6,606,626). In so doing, the Examiner stated:

As to claim 1, Ponnekanti teaches a method for reducing lock contention of concurrent transactions on a plurality of rows of a table in a relational data base system in response to a database query having a set of predicates (see column 2, lines 30-32; column 3, lines 1-9; column 3, lines 26-28; and column 20, lines 8-13), the method comprising the steps of:

(a) scanning all rows of the table within an access range determined by the query (see column 9, lines 59-62; column 9, lines 66-67; and column 10, lines 1-2);

(b) evaluating each scanned row to determine whether the row satisfies the set of predicates (see column 10, lines 1-4); and

(c) returning the row if it satisfies the set of predicates of the query (see column 3, lines 62-63).

As to claim 2, Ponnekanti teaches wherein the scanning step (a) further comprising the step of:

(a1) accessing the rows of the table with uncommitted read semantics irrespective of current locks (see column 12, lines 46-49 and column 16, lines 53-56).

As to claim 3, Ponnekanti teaches wherein the step of evaluating (b) further comprises the steps of:

(b1) evaluating each row to determine whether it satisfies the set of predicates of the query (column 3, lines 2-7); and

(b2) continuing the scan if the row does not satisfy the set of predicates of the query (see column 16, lines 42-44).

Applicant respectfully traverses.

The present invention relates to reducing lock contentions. The invention introduces improved semantics to create result sets in response to queries directed to the relational database by the use of access statements as defined in the SQL Standards. By the improved semantics, access to a table of the database is performed by a scan of all rows of the table, both committed and uncommitted, regardless of existing locks, and by a return of committed rows which fulfill the query predicates. The algorithm that describes the improved semantics comprise the following rules:

1. The rows of a table are scanned with uncommitted read semantics.

2. If a row does not satisfy the predicates, it is skipped and the scan is continued, else an appropriate lock is requested.

3. If the requested lock is refused, the scan is suspended. Once the suspension is lifted, the row is re-evaluated to confirm that the row still satisfies the predicates.

4. If the row no longer satisfies the predicates, the lock is released, the row is skipped and the scan is continued. Otherwise, the row is returned as part of the result set and the scan is continued.

All rows of the result set are committed rows. Locks on rows that do not satisfy the predicates are neither requested nor acquired, which eliminates the situations where the lock requester waits for a lock on the row that is not needed and avoids situations where the lock holder blocks other transactions by holding a lock on the row that is not part of the holder's result set. The present invention, as recited in claim 1, provides:

1. A method for reducing lock contention of concurrent transactions on a plurality of rows of a table in a relational data base system in response to a database query having a set of predicates, the method comprising the steps of:

(a) scanning all rows of the table within an access range determined by the query, wherein the scanning step (a) further comprising the step of:

(a1) accessing the rows of the table with uncommitted read semantics irrespective of current locks;

(b) evaluating each scanned row to determine whether the row satisfies the set of predicates, wherein the step of evaluating (b) further comprises the steps of:

(b1) evaluating each row to determine whether it satisfies the set of predicates of the query;_and

(b2) continuing the scan if the row does not satisfy the set of predicates of the query irrespective of current locks; and

(c) returning the row if it satisfies the set of predicates of the query.

Claims 9 and 17 are apparatus and software claims, respectively, having scopes similar to claim

1.

Ponnekanti is also directed to reducing lock contention and improving concurrency. Nevertheless, Ponnekanti's algorithm is different from that of the present invention. In particular, Ponnekanti fails to teach or suggest "continuing the scan if the row does not satisfy the set of predicates of the query irrespective of current locks," as recited in claims 1, 9 and 17. Rather Ponnekanti considers *two* factors in determining whether to request a lock or to skip the row. The first factor is whether the row satisfies the query and the second factor is the status of the row. (Col. 15, line 55 to col. 16, line 20). Depending on the status of the row, Ponnekanti teaches requesting an instant duration lock even if the row *does not satisfy* the predicates of the query. For example, if the row status is "update" and the row *does not* qualify, Ponnekanti teaches requesting an instant duration lock (col. 15, lines 40-42) just in case the update rolls back and the original data qualifies.

In contrast, the present invention considers only *one* factor in determining whether to request a lock, and that one factor is whether the row satisfies the query predicates. The present invention makes no reference to the status of the row unless the row satisfies the query. Although this exposes the present invention to skipping a row that may actually qualify (if the update rolls back and the original content satisfies the predicates), the benefits of significantly reduced lock contention outweigh these occurrences. (Specification, page 5, lines 9-23).

Applicants respectfully submit that Ponnekanti fails to teach or suggest "continuing the scan if the row does not satisfy the set of predicates of the query *irrespective of current locks*," as recited in claims 1, 9 and 17. Accordingly, claims 1, 9 and 17 are allowable over Ponnekanti. Claims 4-8, 12-16 and 20-24 depend on claims 1, 9 and 17, respectively, and the arguments above apply with full force. Accordingly, Applicants respectfully submit that claims 4-8, 12-16, and 20-24 are also allowable over the cited references.

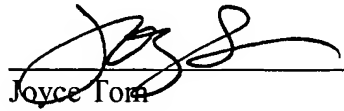
Conclusion

In view of the foregoing, Applicants submit that claims 1, 4-9, 13-17, and 20-24 are allowable over the cited reference. Applicants respectfully request reconsideration and allowance of the claims as now presented.

Applicant's attorney believes that this application is in condition for allowance. Should any unresolved issues remain, Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,
SAWYER LAW GROUP LLP

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Date



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